REMARKS/ARGUMENTS

The specification has been revised to conform it to the preferred format for U.S. patent applications as required in the Office Action, and a Substitute Specification and Comparison Copy are submitted herewith. The Substitute Specification includes a new title as required in the Office Action. The new title information is also on the first page of this Amendment.

Claims 3 and 6-10 are pending in this application. Claims 1, 2, 4 and 5 have been canceled. Claims 3 and 6-8 have been amended. Claims 9 and 10 are new.

The present invention is directed to a chair which actively promotes good posture by effectively preventing the occupant of the chair from taking a slumped position, as is frequently the case when occupants must sit in the chair for extended periods of time.

As is discussed in the Background of the Invention portion of this application, a substantial number of different chair configurations have been proposed to prevent or at least limit slumping by the occupant. None have proved particularly successful in accomplishing this.

The present invention places a barrier member onto the base of the seat of the chair. The barrier member extends above the base and across the full width of the base of the seat. The barrier member is further located aft of a front edge and forward of a rear edge of the seat, and it divides a deformable seat that is placed over the barrier member into a front seat portion and a rear seat portion which are separated by the barrier member. The barrier member is located closer to the rear edge relative to the front edge, as is disclosed in Figs. 1-3, and particularly Fig. 3. This inhibits the person on the seat from moving to any significant extent and thereby also urges the person into a better posture by discouraging a bent posture and/or pelvic instability. In addition, the front and rear seat portions are made of an easily deformed material, and the seat portions are made of a material that is more easily deformed than the material of the barrier member.

Original claim 1 (canceled) has been replaced by new independent claim 9. In relevant parts, claim 9 requires:

- a backrest
- a seat with a base
- front and rear seat portions of resilient material that are attached to a base of the chair
- a barrier member that extends transversely across and upwardly from the base between the front and rear seat portions and is closer to the rear edge relative to the front edge
- that the barrier member has a density that is greater than the density of the front and rear seat portions
- that the barrier member defines a ridge that extends across the width of the seat and is located rearward of the front edge towards the rear edge so as to provide a desired position for the user's buttocks

Original claims 1-8 were rejected for anticipation by Dinsmoor (5,390,384) because Dinsmoor was viewed as teaching a chair with a barrier zone that divides the seat into front and rear seat portions made of a more easily deformed material than the barrier zone so that movement of a user's buttocks from the rear seat portion towards the front seat portion urges the rear seat portion toward the barrier zone, deforms the rear seat portion and inhibits the buttocks from moving towards the front seat portion.

Dinsmoor discloses a seat 1 and not a chair. In the industry of manufacturing chairs there is a significant difference between a chair and a seat. For example, a chair is not a rigid structure fixed to a surface as is a car-vehicle seat, stadium seat, airline seat, etc. A chair merely rests on a surface and is movable relative to that surface by a user. A seat does not move relative to the surface it is secured to. Dinsmoor's seat 1 includes a base 5, a fluid pad 7 and an intermediate layer 9. The intermediate layer 9 is a resilient compressible foam (see for example column 4, line 36), and base 5 is a shaped tray made from a relatively rigid closed-cell foam or

other relatively rigid and incompressible material such as plastic, wood or metal (column 4, lines 37-40). The intermediate layer 9 is substantially U-shaped and is made of an open-cell structure that vents air when compressed (see for example column 5, lines 7-14).

Contrary to Dinsmoor, the present invention as defined by independent claim 9 is a chair having a backrest 35 and a seat 5 with a base 25 and front and rear seat portions 15, 20 attached to the base 25 and made of substantially the same density of resilient material. A barrier member 10 extends transversely across the base 25 and upwardly from the base 25 between the front and rear seat portions 15, 20. The barrier member 10 has a density greater than the density of the front and rear seat portions, forms a ridge that extends longitudinally across the width of the seat 5, and is located rearward of the front edge towards the rear edge.

Amended independent claim 9 requires a backrest. Dinsmoor only discloses a seat and no backrest. At least for this reason, Dinsmoor does not anticipate claim 9.

Claim 9 further requires "a front seat portion of resilient material attached to the base ...."

Dinsmoor has a tray or base 5 constructed of a rigid material such as plastic, wood or metal (column 4, lines 37-40) which defines an upper seating surface 15 at a forward section 11 of the seat. The forward section 11 of the upper seating surface forms "a shelf to support the user's thighs (see FIG. 13)." (Column 4, lines 44-46). Dinsmoor has no front seat portion made of resilient material that is attached to the base. For at least this further reason, Dinsmoor does not anticipate claim 9.

Claim 9 also requires "a barrier member extending transversely across the base and upwardly from the base ..., the barrier member having a density greater than the density of the front and rear seat portions ...."

Dinsmoor has a fluid pad 7 in the form of one or multiple pouches 2, 4 and 6 which are filled with a fluid that exhibits "non-resilient, non-restoring properties typical of plastic or viscous thixotropic materials which flow gradually when pressure is applied to them ...." (Column 5, lines 27-30). The fluid pad 7 lies on "an intermediate layer 9 of resilient,

compressible foam". (Column 4, lines 35-36). The intermediate foam layer in turn rests on a contoured upper surface 19, 19' of the base.

Dinsmoor does not have a barrier member that extends transversely across the base and upwardly from the base, as required by claim 9. For at least this additional reason, Dinsmoor does not anticipate claim 9.

In the event foam layer 9 of Dinsmoor is considered to be a barrier member that extends upwardly from the base, then Dinsmoor's barrier layer does not have "a density greater than the density of the ... rear seat portions" as required by claim 9 because intermediate layer 9 is made of resilient, compressible foam (column 4, line 36), while fluid pad 7 is filled with liquids that "exhibit non-resilient, non-restoring properties typical of plastic or viscous thixotropic materials ...." (column 5, lines 28-30). A barrier made of resilient, compressible foam does not have a density that is greater than the density of plastic or viscous thixotropic materials. Thus, for at least this alternative reason, claim 9 is not anticipated by Dinsmoor.

Finally, claim 9 requires that the barrier member "is a ridge extending longitudinally across a width of the seat ...." Neither the upper surface 19' of Dinsmoor's seat well nor the liquid in fluid pad 7 (should it be considered to be the barrier member) is a ridge, nor does it extend across the width of the seat as required by claim 9.

For at least this further reason, claim 9 is not anticipated by Dinsmoor.

Original claims 1-8 were also rejected for anticipation by Owen (WO 9300029 A1), which was viewed as disclosing a chair with a barrier zone that divides the seat into front and rear seat portions and a barrier zone made of a material having a higher density than the rear seat portion, and wherein the barrier zone is a ridge that extends at least partially longitudinally across the width of the seat.

Owen discloses a chair having a shell 5 supporting a cushion 1 and a backrest 2 to be used as a movie theater seat. The cushion 1 includes a plurality of zones as best seen in Figure 2: Zone 7 is of resilient foam material and covers the majority of the cushion starting at the rear and heading towards the front edge; zones 8 and 9 are of a lower density material than

zone 7 and overlap each other in the center upper face of the cushion; zone 11 is of a lower density foam than that of zone 7, occupies the front portion of the cushion, and is adapted to be compressed by a user's legs (see Figures 3 and 4); zone 14 is of a higher density foam than that of zone 7 and prevents "bottoming" with a heavy user; zone 26 is a layer of low density foam and zone 23 is an intermediate layer of foam, both of which cover zone 14. The zones 14, 23, 26 are concavely shaped (page 4, lines 26-31). The forward ends of zones 14 and 23 are located at the front of the cushion under the thighs of a user, as is illustrated in Figs. 2, 3 and 4.

Contrary to the above, the present invention as defined by claim 9 is for a chair having a backrest 35 and a seat 5 with a base 25 and front and rear seat portions 15, 20 made of substantially the same density resilient material and attached to the base 25. A barrier member 10 extends transversely across the base 25 and upwardly from the base 25 between the front and rear seat portions 15, 20. The barrier member 10 has a density greater than the density of the front and rear seat portions, forms a ridge that extends longitudinally across the width of the seat 5, and is located rearward of the front edge towards the rear edge. Owen does not disclose or suggest these features.

In Owen, the front seat portion 11 has a lower density than the density of base layer 7 (page 4, lines 10-14) and is supported by the front end of the base layer (as shown in Fig. 1), or the base layer may simply extend into the front region 11 (page 4, lines 10-14).

In neither event is the front seat portion of Owen, namely foam region 11 defining front edge 10, "attached to the base" as required by claim 9. At least for this reason, claim 9 is not anticipated by Owen.

Claim 9 further requires that "the barrier member is a ridge extending longitudinally across a width of the seat and [is] located rearward of the said front edge towards the said rear edge so as to provide a desired position of a user's buttocks ...."

Owen has a foundation layer 14 that extends over most of the front to rear length of base layer 7. Fig. 2 shows that the front end 24 of the foundation layer is thicker than the aft end 25 thereof. Fig. 2A, "a transverse cross-section through the foundation layer of the cushion

in the region under the soft zones [8 and 9]" (page 3, lines 4-6), shows that the same thicker portion as in the front of the foundation layer 14 also extends along the sides thereof. This is so because the foundation layer has "a relatively thinner area (25) in the region beneath the buttocks of a typical user" (page 4, lines 24-25) in order to give the foundation layer a concave upper surface 26.

Due to this configuration of the foundation layer, it does not and, indeed, cannot form a ridge that "extends longitudinally across a width of the seat" as required by claim 9. Whatever ridge might be formed by the thicker front end 24 of Owen's foundation layer, it extends at most partially across the width of the seat, as was acknowledged in the Office Action.

Since claim 9 requires that the ridge extends across the width of the seat, and not just partially across the width, claim 9 is not anticipated by Owen for at least this reason.

Further, and disregarding the fact that Owen's ridge does not extend across the width of the seat, if the thicker portion of the foundation layer were considered to form a ridge, the ridge is not located "so as to provide a desired position of a user's buttocks" as required by claim 9. To the contrary, Owen provides relatively lower density or soft zones 8 and 9 (Figs. 1 and 2) which support the user of the chair as follows:

> When a user sits in the seat in a upright position, the buttocks of the user are located in the low density zone (8) providing a comfortable cushion beneath the buttocks. (page 5, lines 19-21)
>
> When the user reclines into a slumped position, the buttocks are comfortably located within the soft zone (9) .... (page 5, lines 30-32)

Although the exact positioning of soft zones 8, 9 of Owen is not described, Figs. 1 and 2 clearly show that the soft zones are aft of the thicker front portion 24 of foundation layer 14. Thus, the thick portion of that layer plays no role in providing "a desired position of a user's buttocks" as required by claim 9.

For at least this further reason, claim 9 is not anticipated by Owen.

Figs. 3 and 4 of Owen are cross-sectional views which illustrate the support Owen's cushion provides for users. The relatively thicker portion 24 of foundation layer 14 is located "in the area beneath the thighs of a typical user ...." (Page 4, lines 21-24). If the relatively thicker portion 24 of the foundation layer 14 were considered the "barrier member", the thicker portion does not function to inhibit the buttocks from moving towards the front seat portion, as is also required by claim 9. In Owen, the concave soft zones 8 and 9 support and constrain the buttocks of the user, not a ridge that extends across the width of the seat.

For at least this additional reason, claim 9 is not anticipated by Owen.

Claim 9 also requires that the barrier member is "located closer to said rear edge relative to said front edge", as best seen in Fig. 3. Owen only discloses that the location of the thicker portion 24 of foundation layer 14 is close to the forward end underneath the person's thighs (page 4, line 23) and close to the front end of the seat. Owen contains no disclosure that the barrier member should be closer to the rear edge than the front end of the seat. For at least this additional reason, claim 9 is not anticipated by Owen.

Original claims 1-8 were further rejected for anticipation by Dixon (WO 96/12425 A1), which was viewed as teaching a chair with a barrier zone dividing the front and rear seat portions and wherein the barrier zone is a ridge extending "at least partially" longitudinally across the width of the seat.

Dixon discloses a forwardly tilted chair having a seat 10 with a base 11 and a pair of raised ridges 13 located towards the front edge of the seat. The ridges 13 are separated by a gap 14. The ridges are made of foam padding and are used to thicken that particular portion of the seat. A cushioning material 16 of foam covers the base and ridges as best seen in Figure 2. There is no teaching in Dixon that the ridges are made of a material that is different from that of the cushion. The seat in use is always tilted downwardly and forwardly as shown in Figure 2. The base 11 is made of timber, metal or plastic.

Contrary thereto, the present invention as defined by claim 9 is for a chair with a backrest 35 and a seat 5 with front and rear seat portions 15, 20 of substantially the same density

of resilient material that are attached to the base 25. A barrier member 10 extends transversely across the base 25 and upwardly from the base 25 between the front and rear seat portions 15, 20. The barrier member 10 has a density greater than the density of the front and rear seat portions and forms a ridge that extends longitudinally across the width of the seat 5 and is located rearward of the front edge towards the rear edge. Dixon does not disclose or suggest such features.

Independent claim 9 requires in relevant parts that the barrier member has a density greater than the density of the front and rear seat portions. Dixon teaches that the ridge is defined by two spaced-apart inserts that "are covered by a cushioning material 16 such as a foam plastics material". (Page 3, lines 35-36). There is no indication what the inserts are made of, but the clear implication is that it is of a material that is not different from that of the cushion and is not a material that has a density greater than the density of the front and rear seat portions. For at least this reason, claim 9 is not anticipated by Dixon.

Claim 9 further requires that the barrier member is "located closer to said rear edge relative to said front edge" as best seen in Fig. 3. As is shown in Figs. 1-7 of Dixon, the ridges 13 are close to the forward end of the seat and not closer to the rear end of the seat than the front end as required by claim 9.

For at least this further reason, claim 9 is not anticipated by Dixon.

Thus, independent claim 9 is not anticipated by Dinsmoor, Owen or Dixon.

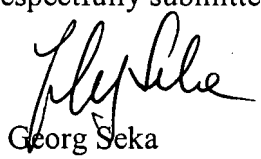
Dependent claims 3, 4, 6-8 and 10 are directed to specific features of the present invention that are independently patentable over Dinsmoor, Owen and Dixon. These claims are further allowable because they depend from an allowable parent claim.

CONCLUSION

In view of the foregoing, applicant submits that this application is in condition for allowance, and a formal notification to that effect at an early date is requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (415) 273-4730 (direct dial).

Respectfully submitted,



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~~A~~Attorney Docket No. 84341
Client No. 638939US:GMT

SUBSTITUTE SPECIFICATION

CHAIR WITH SEAT PROMOTING GOOD POSTURE

Field of the Invention

[0001] The present invention relates to chairs and, in particular, to a chair which actively supports good posture.

Background of the Invention

[0002] The human body is not well designed for sitting for prolonged periods, yet modern work patterns and lifestyles require us to do just that. When seated, most of the body weight is supported on two pointed bones which form the base of the pelvis. These bones are known as the ischial tuberosities. In the seated state, the pelvis is inherently unstable - it is rather like a triangle balanced on its point.

[0003] When seated, the weight of the body trunk, supported by the spine, tends to rotate the pelvis backwards, pushing the spine into a c-shaped curve known as kyphosis. The buttocks then tend to slide forward on the seat, reinforcing the c-curve in the spine.

[0004] If the spine is in kyphosis, pressures within the discs of the spine increase very markedly, which will lead to degenerative changes over time, potentially causing severe pain. In addition, with the spine in kyphosis, the rib cage cannot readily expand, nor can the diaphragm move downwards fully. Hence, respiratory efficiency is greatly reduced, which in turn affects many body functions dependent upon blood oxygen levels.

[0005] Good posture is important because it ~~minimises~~minimizes the risk of back pain and improves respiratory efficiency. Various approaches to chair design have been adopted with the aim of encouraging correct seating posture.

[0006] These existing designs include the "kneel" chair, popular in the 1970's and 1980's, which supports the buttocks on a surface inclined forward at approximately 30 degrees and

prevents the user sliding forward by taking part of the body weight on a knee pad in front of and below the main seating surface. This chair attempts to encourage sound posture initially, but imposes significant load on the knees, which can lead to pain over time. In addition, because no support is provided for the trunk, the user's muscles are constantly in use to ~~stabilise~~stabilize the trunk, which can lead to fatigue over time.

[0007] A further example is the "Bambach" saddle chair, which provides a seat member most readily described as a cross between a horse saddle and a bicycle saddle. The user sits astride the seat member. A back support is provided as an option. Like any saddle, this type of seat member causes pressure and chafing and is uncomfortable for females wearing a skirt in particular.

[0008] Australian Patent Application No. 73415/87 discloses the "Dual Density" chair. This chair seeks to prevent the pelvis rotating and sliding forward by allowing the ischial tuberosities to become embedded in a soft rear section of the seat cushion and attempts to prevent forward movement by providing a firmer material at the front of the seat, creating a transverse discontinuity, or "split" across the seat. This chair has the disadvantage that the firmer front section of the seat is uncomfortable and exerts pressure on the back of the user's thighs, with possible impedance of peripheral blood circulation in that area.

[0009] Further, Australian Patent Application No. 29072/99 discloses the "Soft Cell" chair. This chair seeks to address the disadvantage of the dual density seat in circulatory terms. This is attempted by making the chair seat softer at the front and harder at the back of the seat surface. This chair does not support good posture and performs no differently ~~to~~than a standard foam seat cushion in ergonomic terms.

[0010] Another chair design is the "Nottingham" chair, which is designed to allow seating over a wide range of working heights, to allow users of varying stature to address a range of working surface heights comfortably. It attempts to address the issue of spinal stability and correct postural curvature by opening up the angle between the trunk and thighs by encouraging the user to adopt a higher seat height.

[0011] Lastly, the "Kneeshaw" chair~~,~~ seeks to maintain pelvic (and hence spinal) alignment by lodging the ischial tuberosities in a depression at the rear edge of the seat cushion.

[0012] Accordingly, there is a need to provide a chair that provides good posture and user comfort without the disadvantages of load or pressure on inappropriate areas of the body, such as knees or thighs, and that does not include complex upholstery configurations, such as those which may pose hygiene problems by the accumulation of dirt, for example.

[0013] The above statements regarding prior disclosures are not to be taken to be admissions of what was well known in the field of chairs.

~~Object~~Summary of the Invention

[0014] It is an object of the present invention to overcome or ameliorate some of the disadvantages of the prior art, or at least to provide a useful alternative.

~~Summary of the Invention~~

[0015] There is firstly disclosed herein a chair, including a seat, wherein the seat includes a barrier zone dividing ~~said~~the seat into a front seat portion and a rear seat portion, ~~said~~the rear seat portion being of a material more easily deformed than ~~said~~the barrier zone, such that in use, movement of a user's buttocks from ~~said~~the rear seat portion towards ~~said~~the front seat portion urges the rear seat portion towards ~~said~~the barrier zone, deforming ~~said~~the rear seat portion and inhibiting ~~said~~the buttocks from moving towards ~~said~~the front seat portion.

[0016] Preferably, ~~said~~the barrier zone is of a material having a higher density than ~~said~~the rear seat portion material.

[0017] Preferably, ~~said~~the front and rear seat portions are of the same density.

[0018] Preferably, ~~said~~the barrier zone is located between 25% to 60% along a length of ~~said~~the seat when measured from a back edge of ~~said~~the seat to a front edge of ~~said~~the seat.

[0019] Preferably, ~~said~~the barrier zone is a ridge extending longitudinally completely across a width of ~~said~~the seat.

[0020] Preferably, ~~said~~the barrier zone is a ridge extending longitudinally partially across a width of ~~said~~the seat.

[0021] Preferably, ~~said~~the barrier zone is a ~~moulded~~molded part of ~~said~~the seat.

[0022] Preferably, ~~said~~the barrier zone is 40 to 100 mm wide.

[0023] Preferably, ~~said~~the barrier zone is located below a top surface of ~~said~~the seat.

Brief Description of the Drawings

[0024] A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings~~, wherein:~~.

[0025] Figures 1 and 2 show seats of embodiments of the present invention; and

[0026] Figure 3 shows a skeletal structure of a human when sitting on the seat of Figure 2.

Detailed Description of the Preferred Embodiments

[0027] In the accompanying drawings, there is schematically depicted a chair 1 including a seat 5 including a barrier zone 10 dividing the seat 5 into a front seat portion 15 and a rear seat portion 20. The rear seat portion 20 ~~being~~is of a material more easily deformed than the barrier zone 10, such that in use, movement of a user's buttocks from the rear seat portion 20 towards the front seat portion 15 urges the rear seat portion 20 towards the barrier zone 10 deforming the rear seat portion 20 and inhibiting the buttocks from moving towards the front seat portion 15.

[0028] The barrier zone 10 or "speed bump" should be of a material having a higher density than the material of the front and rear seat portions ~~15,20.~~15, 20. The barrier zone 10 is a ridge which extends longitudinally, either completely or partially across the width of the seat 5. In the preferred form, the ridge 10 would be approximately 40 to 100 mm wide and located between 25% to 60~~percent~~% along the length of the seat 5 when measured from the back edge 22 of the seat 5 to the front edge 23 of the seat 5. It is also possible that the ridge 10 be integrally formed or a ~~moulded~~molded part of the base 25 of the seat 5.

[0029] This configuration advantageously promotes good posture and user comfort without the disadvantages of load or pressure on inappropriate areas of the body such as knees or thighs and without the need for complex upholstery configurations which increase manufacturing costs~~,~~ and complexity of construction and can pose a potential hygiene problem by trapping dirt and other unwanted materials. The chair 1 takes into consideration the complex relationship between correct function, user comfort, bump shape, bump density relative to cushion density, and bump height relative to the height of the cushion.

[0030] As best shown in Figures 1 and 2, the speed bump 10 lies below a top surface 40 of the seat ~~5~~5, allowing good pressure distribution in normal seating position. It is preferred that the material of the front and rear seat portions ~~15,20 are of~~15, 20 have the same density and are integrally formed. This material could be polyurethane foam. However, any suitable material can be used. It is also conceived that the seat 5 could be adjustable to accommodate the requirements and body ~~type~~types of different users.

[0031] In use and as best seen in Figure 3, when seated, the user's buttocks and ischial tuberosities compress the material, such as foam, in the rear seat portion 20. If the user begins to slide forward (into a poor posture position), the speed bump 10 causes a rapid increase in the density of that foam preventing any further forward slide. As the increase in density is less comfortable, the user will naturally tend to move to the back edge 22 of the seat ~~5~~5, further improving pelvic and spinal alignment.

[0032] The chair 1 should further include a properly supportive backrest 35 which encourages slight lordosis of the lumbar spine (the apex of lumbar support should be located at the L4 vertebrae) and slight kyphosis of the thoracic spine leading to what is known as the "neutral" spine alignment. The ideal backrest design should also discourage side bent posture and a pelvic ~~stability~~instability by encouraging closure of the ~~sacro-iliac~~sacroiliac joint.

[0033] Although the invention has been described with reference to specific examples, it would be appreciated by those skilled in the art that the invention may be embodied in many other forms.